WHAT IS CLAIMED IS:

1. A method for synchronizing a master clock to a slave clock located in master and slave devices communicating with one another via a laser signal beam and a communications channel, each of the devices including a homodyne detector for determining a respective correlation pattern with respect to a phase tuned local oscillator, comprising:

   recording master and slave correlation patterns while the signal beam cycles between first and second operating modes;

   transmitting the master correlation pattern and associated first and second times at which the signal beam shifted between the first and second operating modes and between the second and first operating modes over the communications channel;

   comparing a portion of the master correlation pattern between the first and second times to the slave correlation pattern to thereby determine the time offset between the first and slave correlation patterns; and applying the time offset to the slave clock.

2. The method as recited in claim 1, further comprising generating the master correlation pattern in response to a master local oscillator beam and a time-delayed version of the signal beam.

3. The method as recited in claim 2, wherein the time delay associated with the time-delayed version of the signal beam corresponds to a signal beam transit time between the master and slave devices.

4. The method as recited in claim 1, wherein the first and second operating modes have different polarization states.

5. A method for synchronizing a master clock to a slave clock located in master and slave

devices communicating with one another via a laser signal beam and a communications channel, each of the devices including a homodyne detector for determining a respective correlation pattern with respect to a phase tuned local oscillator, comprising:

recording master and slave correlation patterns while the signal beam cycles between first and second operating modes;

transmitting the master correlation pattern and associated first and second times at which the signal beam shifted between the first and second operating modes and between the second and first operating modes over the communications channel;

calculating a time variance between a portion of the master correlation pattern between the first and second times to the slave correlation pattern to thereby determine the time offset between the master and slave correlation patterns; and

applying the time offset to the slave clock.

6. The method as recited in claim 5, further comprising generating the master correlation pattern in response to a master local oscillator beam and a time-delayed version of the signal beam.

7. The method as recited in claim 6, wherein the time delay associated with the time-delayed version of the signal beam corresponds to a signal beam transit time between the master and slave devices.

8. The method as recited in claim 5, wherein the variance between the master and slave correlation patterns is determined in accordance with the expression:

$$V = \langle [(\hat{I}/\lambda) - (g/\mu)\hat{J}\,]^2 \rangle$$

where:

V is the variance

μ is the phase offset associated with a master homodyne detector generating the

master correlation pattern corresponding to $\hat{J}$,

$\hat{J}$ is the idler homodyne current signal received by the master device;

λ is the phase offset associated with a slave homodyne detector generating the slave correlation pattern corresponding to $\hat{I}$,

$\hat{I}$ is the signal homodyne current signal received by the slave device; and

g is a scaling factor.

9. A clock synchronization system permitting synchronization of a slave clock to a master clock located in slave and master devices, respectively, communicating with one another via two separate communication channels, comprising:

means for generating a laser beam signal disposed in the master device, wherein the signal beam has first and second operating modes;

means for applying the signal beam to the slave device over a master communication channel;

a master homodyne detector disposed in the master device receiving a master phase shifted local oscillator beam;

a slave homodyne detector disposed in the slave device receiving a second phase shifted local oscillator beam;

means for recording master and slave correlation patterns generated by the master and slave homodyne detectors while the signal beam cycles between first and second operating modes;

means for transmitting the master correlation pattern and associated first and second times at which the signal beam shifted between the first and second operating modes and between the second and first operating modes over the second communications channel;

means for calculating a time variance between a portion of the master correlation pattern between the first and second times to the slave correlation pattern to thereby determine the time offset between the master and slave correlation patterns; and

means for applying the time offset to the slave clock.

10. The clock synchronization system as recited in claim 9, wherein the master homodyne detector generates the master correlation pattern in response to the master phase shifted local oscillator beam and a time-delayed version of the signal beam.

11. The clock synchronization system as recited in claim 10, wherein the time delay associated with the time-delayed version of the signal beam corresponds to a signal beam transit time between the master and slave devices.

12. The method as recited in claim 9, wherein the master and slave operating modes have different polarization states.

13. The method as recited in claim 9, wherein the variance between the master and slave correlation patterns is determined in accordance with the expression:

$$V = \langle [(\hat{I}/\lambda) - (g/\mu)\hat{J}\,]^2 \rangle$$

where:

V is the variance

μ is the phase offset associated with a master homodyne detector generating the master correlation pattern corresponding to $\hat{J}$,

$\hat{J}$ is the idler homodyne current signal received by the master device;

λ is the phase offset associated with a slave homodyne detector generating the slave correlation pattern corresponding to $\hat{I}$,

$\hat{I}$ is the signal homodyne current signal received by the slave device; and

g is a scaling factor.

14. If the master clock (124) and the slave clock (214) are already synchonized, and the delay (112) is removed from the system, then the method can be employed to determine the delay $\Delta t = \Delta T$ as derived from process 218. Used in conjunction with the speed of light (c), the associated distance $d = c \cdot \Delta T$ can also be readily obtained. Similarly, the determination of distances d_1 and d_2 using this method of times t_1 and t_2, $t_1 > t_2$, respectively, enables the determination of the associated speed $v = \frac{d_2 - d_1}{t_2 - t_1}$ along the line of sight from station 100 to station 200.